

Ground-based Observing Campaign of Briz-M Debris by NASA's Orbital Debris Program Office

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In 2015, NASA's Orbital Debris Program Office (ODPO) completed the installation of the Meter Class Autonomous Telescope (MCAT) on Ascension Island. MCAT is a 1.3m optical telescope designed with a fast tracking capability for observing orbital debris at all orbital regimes (Low-Earth orbits to Geosynchronous (GEO) orbits) from a low latitude site. This new asset is dedicated year-round for debris observations, and its location fills a geographical gap in the Ground-based Electro Optical Space Surveillance (GEODSS) network. A commercial off the shelf (COTS) research grade 0.4m telescope (named the Benbrook telescope) will also be installed on Ascension at the end of 2016. This smaller version is controlled by the same master software, designed by Euclid Research, and can be tasked to work independently or in concert with MCAT. Like MCAT, it has the same suite of filters, a similar field of view, and a fast-tracking Astelco mount, and is also capable of tracking debris at all orbital regimes. These assets are well suited for targeted campaigns or surveys of debris.

Since 2013, NASA's ODPO has also had extensive access to the 3.8m infrared UKIRT telescope, located on Mauna Kea. At nearly 14,000-ft, this site affords excellent conditions for collecting both photometry and spectroscopy at near-IR (0.9 – 2.5 μ m SWIR) and thermal-IR (8 – 25 μ m; LWIR) regimes, ideal for investigating material properties as well as thermal characteristics and sizes of debris.

For the purposes of understanding orbital debris, taking data in both survey mode as well as targeting individual objects for more in-depth characterizations are desired. With the recent break-ups of Briz-M rocket bodies, we have collected a suite of data in the optical, near-infrared, and mid-infrared of in-tact objects as well as those classified as debris. A break-up at GEO of a Briz-M rocket occurred in January, 2016, well timed for the first remote observing survey-campaign with MCAT. Access to the 3.8m UKIRT telescope has also allowed for investigating this break-up in the near-infrared at wavelengths where debris is often much more reflective, allowing for the potential detection of a smaller population of these debris. In addition, a suite of near-IR reflectance spectroscopy (0.8-2.5 μ m) and thermal-IR (8-15 μ m) of individual in-tact and debris Briz-M objects has been collected. Analysis of the survey data will be discussed.